U.S. FISH AND WILDLIFE SERVICE
SPECIES ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM

SCIENTIFIC NAME: Helianthus verticillatus Small

COMMON NAME: whorled sunflower

LEAD REGION: 4

INFORMATION CURRENT AS OF: October 2005

STATUS/ACTION

___ Species assessment - determined species did not meet the definition of endangered or threatened under the Act and, therefore, was not elevated to Candidate status

___ New candidate

_X_ Continuing candidate

___ Non-petitioned

_X_ Petitioned - Date petition received: May 11, 2004

__ 90-day positive - FR date:

__ 12-month warranted but precluded - FR date:

__ Did the petition request a reclassification of a listed species?

FOR PETITIONED CANDIDATE SPECIES:

a. Is listing warranted (if yes, see summary of threats below)? yes

b. To date, has publication of a proposal to list been precluded by other higher priority listing actions? yes

c. If the answer to a. and b. is "yes", provide an explanation of why the action is precluded. We find that the immediate issuance of a proposed rule and timely promulgation of a final rule for this species has been, for the preceding 12 months, and continues to be, precluded by higher priority listing actions (including candidate species with lower LPNs). During the past 12 months, almost our entire national listing budget has been consumed by work on various listing actions to comply with court orders and court-approved settlement agreements, meeting statutory deadlines for petition findings or listing determinations, emergency listing evaluations and determinations, and essential litigation-related, administrative, and program management tasks. We will continue to monitor the status of this species as new information becomes available. This review will determine if a change in status is warranted, including the need to make prompt use of emergency listing procedures. For information on listing actions taken over the past 12 months, see the discussion of "Progress on Revising the Lists," in the current CNOR which can be viewed on our Internet website (http://endangered.fws.gov/).

___ Listing priority change

Former LP: ___

New LP: ___

Latest Date species became a Candidate: October 25, 1999

___ Candidate removal: Former LP: ___

___ A – Taxon is more abundant or widespread than previously believed or not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status.

___U – Taxon not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status due, in part or totally, to conservation efforts that remove or reduce the threats to the species.

___ F – Range is no longer a U.S. territory.

___ I – Insufficient information exists on biological vulnerability and threats to support listing.

___ M – Taxon mistakenly included in past notice of review.

___ N – Taxon does not meet the Act's definition of "species."

___ X – Taxon believed to be extinct.

ANIMAL/PLANT GROUP AND FAMILY: Flowering Plants- Asteraceae

HISTORICAL STATES/TERRITORIES/COUNTRIES OF OCCURRENCE: AL, GA, & TN

CURRENT STATES/ COUNTIES/TERRITORIES/COUNTRIES OF OCCURRENCE:
Alabama (Cherokee County), Georgia (Floyd County), & Tennessee (Madison County)

LAND OWNERSHIP
All known populations occur on private land. Temple-Inland Container Corporation, an industrial forestry company, owns the sites in Alabama and Georgia. Temple-Inland donated a conservation easement area in the Coosa Valley Prairie of Georgia to The Nature Conservancy which resulted in the protection of the majority of the Georgia plants.

LEAD REGION CONTACT: Rick Gooch, 404/679-7124, richard_gooch@fws.gov

LEAD FIELD OFFICE CONTACT: Jackson, MS Field Office, Cary Norquist, 601-321-1128, richard_gooch@fws.gov

BIOLOGICAL INFORMATION
Species Description

Helianthus verticillatus, a member of the sunflower family, is a perennial arising from horizontal tuberous-thickened roots with slender rhizomes. The stems are slender, erect, and up to 2 meters (m) (6 feet) tall. The leaves are opposite on the lower stem; verticillate (whorled) in groups of 3 to 4 at the mid-stem; and alternate or opposite in the inflorescence at the end. Individual leaves are firm in texture and have a prominent mid-vein. The leaves are linear-lanceolate in shape, narrowing at the tip to a point, and 7.5 to 18.5 centimeters (cm) (3.0 to 7.2 inches (in.)) long and 0.7 to 2.0 cm (0.3 to 0.8 in.) wide. The flowers are arranged in a branched inflorescence with 3

to 5 heads. The heads are about 1 cm high (0.4 in.), 1.5 cm (0.6 in.) wide and have deep yellow ray flowers and lighter yellow disk flowers. The seeds are achenes are 4 to 5 millimeters (0.2 in.) long. Flowering occurs in late August into October (Matthew et al. 2002).

Several members of the aster family are similar in appearance to H. verticillatus, with minor morphological differences being apparent. Helianthus grosseserratus is similar to H. verticillatus but its leaves are arranged in an alternating pattern which differs from the whorled arrangement of H. verticillatus. Helianthus angustifolius can be confused with H. verticillatus but it has narrower leaves and reddish disk flowers, as opposed to the yellow disk flowers of H. verticillatus (Schotz 2001). Helianthus giganteus often exhibits whorled leaves but H. verticillatus leaves have only the midvein prominent as opposed to H. giganteus which has lateral veins evident on the leaves also Matthews et al. 2002).

Taxonomy

Helianthus verticillatus was described in 1898 by J.K. Small based on a collection by S.M. Bain from Chester County, Tennessee in 1892 (Nordman 1998). Small (1898) distinguished it from the related H. gigianteus by its mostly whorled leaves, glabrous stems, narrow, entire leaf blades, and its narrowly linear-lanceolate involucre bracts. No additional collections of this species had been made when Beatley (1963) speculated that the specimens from this single collection site (which lacked basal parts and mature achenes) perhaps represented a single aberrant individual formed from hybridization of a opposite- and alternate-leaved Helianthus species. With no new material to examine, Heiser (1969) and Cronquist (1980) accepted Beatley's suggestion that H. verticillatus was a hybrid.

The rediscovery of the species in 1994 provided ample material for reexamination of this species' taxonomic status. Plants throughout these new populations conform to the morphology of the type collection of H. verticillatus. Recent morphological studies and genetic analyses have validated this species' taxonomic validity (Matthews et al. 2002). Root-tip chromosome counts of the type specimen and recent collections have shown H. verticillatus to be a fertile, diploid species (Matthews et al. 2002).

Habitat

This species is found in moist, prairie-like openings in woodlands and along adjacent creeks. Soils are sandy clays which are alkaline, high in organic matter, and seasonally wet. The soil type in the wet prairie habitat in northwest Georgia is likely of the Ketona series (Matthew et al. 2002) and in Alabama, populations inhabit the Gaylesville silty clay loam soils (Schotz 2001). These series consist of deep, poorly, drained, slowly permeable soils formed from limestone. They are on floodplains and depressed areas in limestone valleys. They are saturated with water in late winter and early spring and subject to flooding. In Tennessee, the population is on Falaya silt loam, from alluvial deposits of Tertiary Porters Creek Clay (Matthew et al. 2002).

The list of associated species in these habitats indicates a community with strong prairie affinities. Dominate grasses of the Tall Grass Prairie are present including. Schizachyrium scoparium, (little bluestem), Sorghastrum nutans (Indian grass), Andropogon gerardii (big bluestem), and Panicum virgatum (switch grass). Other common associates include Carex cherokeensis, Sporobolus heterolepis, Physostegia virginiana, Silphium terebinthinaceum, Pycnanthemum virginianum, Symphyotrichum novae-angliae, Hypericum sphaerocarpum, H. angustifolius, and Helenium autumnale (Matthews et al. 2002, Schotz 2001). These areas are also habitat for a number of other rare species including Marshallia mohrii (Mohr's Barbara's buttons), which is federally listed as threatened.

Life History

There is little information available on the life history of this species and it is unclear why the species is so rare. Helianthus verticillatus has been grown in cultivation and seed germination is high in the laboratory. Upon transplanting, this species has been shown to reproduce rapidly from it rhizomes, forming a dense colony. The stems can reach over 4 meters (13 feet) in height but the heights of the stems decreased to about 2 meters (6 feet) with age (Matthews et al. 2002).

Historical Range

After the first collection of H. verticillatus in 1892 from Chester County, Tennessee, this species was not seen again for over 100 years until in 1994 Allison (1997, 2002) identified a specimen collected by Ware in 1993 from a prairie area in Floyd County, Georgia as H. verticillatus. Surveys by Allison continued, and in 1996, along with A. Schotz of the Alabama Natural Heritage Program, a second population was discovered in a remnant strip of prairie in Cherokee County, Alabama. This new population was about 3.2 kilometers (km) (2 miles (mi.)) west of the Georgia locality. In 1998, Nordman (1998) rediscovered the species in Tennessee with his collection near Pinson in Madison County. Pinson is about 10 km (6.3 mi.) northwest of Henderson, the locality given for Bain's 1892 collection. Nordman surveyed Chester and Madison Counties, Tennessee, along with four contiguous counties and found no other populations (Nordman 1999). In 1999, Schotz (2001) found a second occurrence in Alabama, about 2 km (1.2 mi.) southwest of the other Alabama population. Continued surveying in Floyd County, Georgia have revealed several additional local populations in the general area of the original Floyd County population (Allison 2002).

Current Range

Currently, there are a total of six populations known for this species. There are two populations documented for Alabama (both in Cherokee County); three in Floyd County, Georgia (separated from one another by a distance of 3/4 to 1 mile); and a single site in Madison County, Tennessee.

Population Status/Estimates

Status surveys have been conducted for this species throughout its range (Allison 2002, Lincicome 2003, Nordman 1998, Schotz 2002). Despite these extensive surveys, population numbers have remained low. Schotz (2002) located 1 new population out of 44 attempts, representing a success rate of only 2 percent. It is difficult to determine the exact number of plants due to the species' rhizomatous nature; however, estimates of population sizes have been made. The largest population known occurs in Georgia where thousands of plants are estimated to occur within the vicinity of the original site in the prairie. At the second Georgia site only four plants have been counted and 35 were observed at the third Georgia site (Allison 2002). The Alabama sites are both rated "C", which implies that each occurrence is small and partially degraded, but can be potentially enhanced with restoration efforts (Schotz 2002). Stem counts at one site were 64 and 37 at the second Alabama site. The plants occupy areas less than few hundred meters squared and both are considered feeble populations (Schotz 2002). At the single site in Tennessee, an estimated 700 to 1,200 stems were found growing along a railroad right-of-way, in an adjacent hayfield, along a roadside right-of-way, and along a nearby creek (Nordman, pers. comm. 1999). Surveys during 2000 and 2002 in Tennessee were unsuccessful at locating any additional sites (Lincicome 2003).

The majority of the Georgia plants are within a 929 acre conservation easement donated to The Nature Conservancy by Temple-Inland in 2003. The donation of this easement ensures permanent protection for those plants within the easement by restricting timbering activities and future development on the property. Active management of the site and monitoring studies are ongoing as part of the easement agreement (Allison pers. comm. 2004, Breyfogle in litt. 2005).

THREATS

A. The present or threatened destruction, modification, or curtailment of its habitat or range.

This species appears to be a narrow habitat specialist occurring in natural wet meadows or prairies and calcareous barrens. Such habitats were likely more extensive in the East before European settlement, subsequent fire suppression, and conversion of large areas to farmland (Allison 1995 cited in Matthews et al. 2002). Today these prairie areas are not very extensive, and they are often degraded or destroyed for a number of reasons (i.e., agriculture, timber harvest, residential development). Most of the remaining wet prairies exist as remnants along roadside rights-of-way where mid-successional stages are artificially maintained (Allison in litt. 1999, Matthew et al. 2002).

The greatest threat to this species appears to be from industrial forestry practices (Allison in litt. 1999). While surveying potential habitat for additional populations, Allison (in litt. 1999) noted that much of this species' prairie habitat had been converted to pine monoculture. Both of the Alabama populations have been impacted by timbering (Schotz 2002).

Helianthus verticillatus has not been relocated at the type locality in Tennessee despite intensive surveys of that area (Nordman 1998). However, this record is over 100 years old and locality information is vague, so it is not possible to ascertain the reason for the loss of that site. In Tennessee, much of this species' suitable habitat has been converted for agricultural usage (Nordman, pers. comm. 1999). The extant Tennessee population is surrounded by cultivated fields and pastures. The largest concentration of plants at the Tennessee population is located in a natural hayfield (Nordman 1998). Improvement of the hayfield with fertilization and the introduction of non-native grasses would be detrimental to the population. Plants extending onto the roadside at this site were subjected to herbicide spraying in association with roadside maintenance in 2004; however, the long-term impact to this population has not yet been assessed (Lincicome in litt. 2005). Plants at one of the Alabama sites extend onto a roadside and is also vulnerable to accidental disturbances if herbicides are used in association with right-of-way maintenance. Any future road construction poses a potential threat to plants located near the road.

With the exception of a small outlying population, the Georgia populations of this species are protected from habitat destruction or degradation due to their inclusion in a 929 acre conservation easement area donated by the Temple-Inland Corporation to The Nature Conservancy (Breyfogle, Temple-Inland Corporation, in litt. 2005).

B. Overutilization for commercial, recreational, scientific, or educational purposes.

Helianthus verticillatus is currently not known to be a component of commercial wildflower trade; however, it is attractive and has horticultural potential. Taking and vandalism pose threats because of the species' visibility when flowering and the accessibility of the sites.

C. Disease or predation.

This species is not known to be threatened by disease or predation.

D. The inadequacy of existing regulatory mechanisms.

Helianthus verticillatus is a species of special concern in Tennessee and considered endangered in Alabama and Georgia (Allison, pers. comm. 1999; Nordman, pers. comm. 1999; Schotz, Alabama Heritage Program, pers. comm. 1999). The majority of the Georgia population is protected through a conservation easement with The Nature Conservancy. The Alabama and Tennessee sites receive no protection.

E. Other natural or manmade factors affecting its continued existence.

The whorled sunflower is extremely vulnerable because of the small number of known populations. Helianthus verticillatus appears to have restricted ecological requirements and is dependent upon the maintenance of prairie-like openings for its survival. Soil conditions, in combination with occasional, naturally occurring fires, are thought to have played a role in

maintaining suitable habitat. Much of this species' habitat has been degraded due to fire suppression and the subsequent invasion of woody competitors (Allison, pers. comm. 1999). Extant sites will require active management to keep competition and shading under control.

CONSERVATION MEASURES PLANNED OR IMPLEMENTED:

Temple-Inland Corporation donated a 929-acre conservation easement of Coosa Valley prairie property in Georgia to The Nature Conservancy, thereby protecting the Georgia populations of this species. In 2002, The Georgia Department of Natural Resources and The Nature Conservancy worked with staff of Temple-Inland to develop a 10-year management plan for conservation of rare species within this easement area. Site specific plans for the management of several open wet prairies known to provide habitat for this species within the easement were developed. Temple-Inland implemented a prescribed burn and selective timber harvest on 600 acres of the easement in 2001 to improve habitat conditions for this and other species. Since then, Temple-Inland has conducted additional burns within the easement area in 2002, 2004 and 2005. Mechanical thinning and exotic control is also a regular part of their management of this site. Vegetation monitoring is being conducted by TNC and GADNR on a regular basis and will aid in assessing effectiveness of management actions.

Funding has been received for initiating landowner contacts and development of a site conservation plan for the single site in Tennessee for 2005/2006 (Lincicome in litt. 2004, 2005). The Service has funded status surveys throughout the species' range. These surveys have been completed. Plants are on display as an educational exhibit at the Lichterman Nature Center in Tennessee (Lincicome in litt, 2004). A graduate student at Vanderbilt University of Tennessee is conducting research to determine genetic variability of this species throughout its range and within individual populations (Breyfogle in litt. 2005).

SUMMARY OF THREATS:

This species has a restrictive range and is only known from six sites. It appears to have restricted ecological requirements and is dependent upon the maintenance of prairie-like openings for its survival, thus active management of habitat is needed to keep competition and shading under control. Much of its habitat has been degraded or destroyed for agricultural, silvicultural, and residential purposes. The Alabama populations have been impacted by timber harvesting in the past and such is seen as a potential threat to those sites. Populations near roadsides are threatened by herbicide usage in association with right-of-way maintenance. The majority of the Georgia populations are protected as they are located within a conservation easement area.

RECOMMENDED CONSERVATION MEASURES:

Work with Temple-Inland Corporation to obtain protection and management for plants outside easement area in Georgia and for populations in Alabama; work with State and landowners in Tennessee to obtain protection for Tennessee population; develop agreement with Dept. of Transportation to ensure protection of plants extending onto rights-of-ways; encourage and

support additional surveys for populations.

LISTING PRIORITY

THREAT			
Magnitude	Immediacy	Taxonomy	Priority
High	Imminent	Monotypic genus	1
		Species	2
		Subspecies/population	3
	Non-imminent	Monotypic genus	4
		Species	5
		Subspecies/population	6
Moderate to Low	Imminent	Monotypic genus	7
		Species	8
		Subspecies/population	9
	Non-imminent	Monotypic genus	10
		Species	**11****
		Subspecies/population	12

Rationale for listing priority number:

Magnitude: Though there are only 6 populations, the largest site is permanently protected through a conservation easement with The Nature Conservancy, thus the magnitude is considered moderate.

Imminence: The species appears to withstand some disturbance and there are no known immediate threats, thus threats are considered non-imminent.

Yes Have you promptly reviewed all of the information received regarding the species for the purpose of determining whether emergency listing is needed?

Is Emergency Listing Warranted? No, this species is not in imminent danger of becoming extinct as the largest site is permanently protected through a conservation easement. This site is actively managed and monitored. Currently there are no known projects that pose a threat to the other populations. There is an indication that protection can also be obtained for the Alabama sites.

DESCRIPTION OF MONITORING

Species experts, botanists with the state conservation programs within this species' range, and affect Service offices were given a copy of the most recent candidate form for review and asked

to supply any new information. Those contacted are as follows: Mincy Moffett, botanist with the Georgia Department of Natural Resources (GADNR), Al Schotz, botanist with the Alabama Natural Heritage Program, and David Lincicome of the Tennessee Department of Environment and Conservation (TDEC) were contacted in March of 2005 and again in September of 2005, as were the Service's Athens, GA, Cookeville, TN, and Daphne, AL field offices. In October of 2005, contact was made with Wayne Barger of the Alabama Heritage Program with the State Lands Division of the Alabama Department of Conservation and Natural Resources. Moffett, with GADNR, also solicited information from Sam Breyfogle of Temple-Inland Corporation in September, 2005. Information from Breyfogle was incorporated into the revised candidate form. Site visits were made to the Tennessee and Alabama sites in the Fall of 2004. TNEC makes annual visits to the TN site so a site visit is expected in 2005. The Georgia sites are annually visited by TNC, GADNR, and/or Temple-Inland staff.

COORDINATION WITH STATES

Indicate which State(s) (within the range of the species) provided information or comments on the species or latest species assessment: Georgia and Tennessee

Indicate which State(s) did not provide any information or comments: Alabama

LITERATURE CITED

Allison, J.R. 1997. Rediscovery of the whorled sunflower, Helianthus verticillatus Small (abstract). ASB Bulletin 44(2):143-144.

Allison, J.R. 2002. Survey for Helianthus verticillatus Small in Georgia. Unpublished report of the U.S. Fish and Wildlife Service, Jackson, MS. 2 pp. + appendices.

Beatley, J.C. 1963. The sunflowers (genus Helianthus) in Tennessee. J. Tenn. Acad. Sci. 38:135-154.

Cronquist, Arthur. 1980. Vascular Flora of the Southeastern United States. Vol. 1, Asteraceae. University of North Carolina Press. Chapel Hill, NC. 261 pp.

Heiser, C.B., Jr. 1969. The North American sunflowers (Helianthus). Mem. Torrey Bot. Club 22(3).

Lincicome, D. 2003. Survey for new populations of whorled sunflower, Helianthus verticillatus. Unpublished report to U.S. Fish and Wildlife Service. 2 pp. + appendices.

Matthews, J.F., J.R. Allison, R.T. Ware Sr., and C. Nordman. 2002. Helianthus verticillatus Small (Asteraceae) rediscovered and redescribed. Castanea 67: 13-24

APPROVAL/CONCURRENCE: Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes, including elevations or removals from candidate status and listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all resubmitted 12-month petition findings, additions or removal of species from candidate status, and listing priority changes.

Approve: /s/ Jeffrey M. Fleming 11/16/2005
Acting Regional Director, Fish and Wildlife Service Date

Concur: _____ August 23, 2006
Acting Director, Fish and Wildlife Service Date

Do Not Concur: _____ _____
Director, Fish and Wildlife Service Date

Date of annual review: October 2005

Conducted by: Jackson, Mississippi Field Office